THE ADVOCATE OF SCIENCE.

Vol. 1.] KNOWLEDGE IS POWER—HAPPINESS—VIRTUE. [Nos. 11 & 12.

Wm. P. Gibbons, S. W. cor. of 6th and Cherry sts. PHILADELPHIA, SIXTH MONTH 6th, 1833. Semi-monthly.—One dollar for 50 Numbers

For the Advocate of Science.

GEOLOGY, No. 8.

Recapitulation.—Among the transition strata, and next above the *grey-wacke slate*, is *transition*, or *mountain limestone.* It is composed of lime and carbonic acid, and differs from the primitive limestone, in being less perfectly crystallized, and containing the remains of animals and plants. Being softer in some parts than others, channels for subterranean rivers are often washed through it, and extensive caverns formed. It contains much ore, and supplies a great variety of the most beautiful marbles. The large fragments contained by some of the transition rocks indicate the violence of the causes that operated in their formation; whilst the perfect and unbroken petrifactions contained by others, show that these were made during a state of complete quiescence of the earth. The *secondary* class is next in order, the deepest of which claiming our notice is the *coal* formation. Coal occurs in layers, alternating with numerous layers of sandstone, slate, clay, &c. It appears to have been formed in the beds of ancient lakes. A *coal field* is the name given to one such deposit. The pyrites associated with coal, renders coal mines liable to spontaneous combustion. Some of these subterranean conflagrations are inextinguishable. Iron ore is always found with coal—a most happy circumstance, on which the wealth and prosperity of nations often depend. Coal, and more especially the slate in connexion with it, contain many fossils.

Dykes.—These are a striking feature of coal mines. By a *dyke* is meant simply a wall of rock which intersects the strata of a coal field. Dykes consist mostly of a rock called *basalt*, which is supposed to be the result of fusion by subterranean fire. The strata on the two sides of a dyke do not correspond with each other, having been disturbed by the formation of the wall. In mining for coal, when the workmen meet with a dyke, as might be supposed, they break through it. But instead of finding coal on the opposite side, they commonly discover sandstone, or slate, or some other rock. This new stratum is now carefully examined, and compared with those which lie above and beneath the coal on the explored side. If it correspond in character with one of the beds which they have already found resting *above* the coal, they must pursue their operations *downward* in order to reach the object of their labor. But should the new stratum be the same that is situated *beneath* the coal on the explored side of the dyke, they must pursue their search in an *upward* course, when they will soon hit upon the desired bed, which, in this case, has been raised in the newly opened mine from its original position. Sometimes, the dyke is the division line between two mines owned by different persons. Should the water collect in the upper mine, a few strokes of a pickaxe upon the wall would suffice to afford a passage for the water into the lower mine, and thereby, in all probability, ruin it, by preventing it from being worked.

Gypsum and rock salt.—Above the coal formation is a series of strata, consisting of numerous deposits of *marl*, which is an impure limestone, mixed with clay, and *sandstone.* In the upper part of this series we meet with *gypsum*, or plaster of Paris, and *rock salt*, together with salt springs.

Source of rock salt.—Beds of salt appear to have resulted from the evaporation of the water of salt lakes, forming strata which are subsequently covered by various deposits.

Salt lakes, springs, and licks.—The Caspian Sea is a vast salt lake, and the Dead Sea is so strongly impregnated with salt, that fish cannot live in its waters. In many parts of the north of Africa, the springs and wells contain salt water, and the inhabitants are forced to depend on rain for their supply for drinking, and for culinary purposes. In Abyssinia, salt is deposited from springs and streams, and collected from such situations by the natives, who employ it as a medium of exchange, instead of money. The banks of some streams near the Rocky mountains, are incrusted in the same manner, and also the soil on the edge of salt springs in the western united States. Herds of deer and other animals resort to such places, and lick the ground to get the salt; hence the name *Salt Licks.* In the western part of New York state, and in Missouri, and other places, the article is very extensively manufactured from the water of springs, which sometimes contains one-sixth of its weight of salt.

Mountains, &c. of salt.—The most remarkable mountain of salt is Mount Cardona, in Spain. It is two or three miles in circuit, and two hundred yards high, consisting almost entirely of pure salt. "Nothing can compare," says a traveller, "with the magnificence of the spectacle which Mount Cardona exhibits at sunrise. Besides the beautiful form which it presents, it appears to rise above the river that washes its base, like a mountain of precious gems, displaying all the varied hues of the rainbow." In the elevated mountains of Peru, rock salt is said to occur at the height of 9000 feet above the level of the sea. In the lofty desarts of Caramania, in Asia, it is so abundant, and the atmosphere is so dry, that the inhabitants use it as a stone for building their houses. The island of Ormus in the Persian Gulf is one large mass of rock salt.

Salt mines.—The salt mines of Poland are the most extensive in the world, being worked more than 800 feet deep, 6000 long, and 2000 wide. The laborers are Catholics, and construct their chapels under ground, by admitting the salt water, of which springs are abundant, and suffering it to deposit the salt on the walls, and in pendants from the ceiling. A single torch in these chapels, produces a most brilliant effect, the crystals on every side presenting the appearance of beautiful and luminous stars. A remarkable circumstance in these mines is, the occasional occurrence of springs of perfectly fresh water.

Lias clay, and lias limestone.—These appellations are given to a series of deposits belonging to the secondary class, and next above those we have just noticed. They consist principally of clay, limestone, and impure slate.

Enormous skeletons found in lics.—These strata are chiefly remarkable for the abundance of the relics they contain belonging to a more perfect order of animals than those before observed. The most singular are some of the *saurian* or lizard tribes, whose extraordinary forms are still more astonishing than their immense magnitude. Some of these animals attained the length of forty feet or more, and appear from the structure of their teeth and organs of motion, to have united to the voracity of the crocodile, the power of darting through the water on their prey with inconceivable rapidity. Some had very long slender necks, and were supplied with paddles instead of feet, to accelerate their motion through the water. In two skeletons of the fish-lizard, a reptile of this long extinct family, the sockets of the eyes measured nearly a foot in diameter. From the researches of Cuvier, it would appear that some of these monsters had membranous wings, and were in reality, *flying dragons.*

Gigantic vegetables.—The lias strata also contain the petrified trunks of large plants, bearing a resemblance to the palms, arborescent ferns, and gigantic reeds of tropical climates. They far exceed in magnitude any plants of the kind that belong to the present condition of our earth.

The chalk formation.—The last, and of course the highest, of the secondary class, is *chalk.* It is composed of lime in union with carbonic acid, as are the limestones previously enumerated; but it appears to have been deposited from a state of mechanical suspension of the ingredients in water, and consequently is not in its crystaline structure.

Fossils in chalk.—Chalk abounds in petrified shells. The forms of the greater part of them are perfectly preserved, the most delicate structures re-

taining exactly their original shape. The animals that are here buried, appear to have resided in shallow seas, not being adapted by their organization for living in very deep water. They show us that our planet has undergone an important revolution between the periods at which the different strata were deposited. For, as the strata below the chalk contain the remains of animals peculiar to those strata, whose races appear to have been annihilated in the formation of the rocks which entomb them, so we discover in the chalk deposit a peculiar creation of animals, not living at the present day, nor buried in any of the other strata. S.

For the Advocate of Science.

The Philosophy of Aristotle and Bacon: or Ancient and Modern Logic.

The interesting departments of science, the promotion of which was contemplated in the publication of "THE ADVOCATE OF SCIENCE," were not successfully cultivated until within the two last centuries. The philosophers of former days were mostly engaged in metaphysical subtleties, and such occupations of the mind as were adapted to a closet life. The works of nature were neglected, or elicited, at most, a confused mass of discordant opinions and baseless conjectures. Astronomy might boast of a few adventurous spirits, and the mathematics of their Euclid and their Archimedes. But the observations of the ancients on the subject of astronomy, rested on a very unsettled foundation. For, at a period no farther distant than the sixth century of the Christian era, long after the correct system had been advanced by Pythagoras, and hundreds of years since the time of Euclid and Archimedes, it was gravely maintained by a celebrated philosopher, that the earth was an oblong plane, surrounded by an impassable ocean—that an immense conical mountain at its northern extremity was the centre around which the heavenly bodies daily revolved;—that the heavens were an immense arch, supported on the one side by the earth, and on the other, by two mighty pillars beyond the sea; and that a multitude of angels were employed in directing the motions of the stars beneath this vault!

But whilst the mathematical sciences, under the auspices of those brilliant lights, advanced with astonishing rapidity, the history of our favorite departments exhibits not the name of any fostering genius, if we except Aristotle, the sage of Stagira. This sovereign dictator of opinions, collected many valuable facts in natural history; but his thirst for celebrity as a leader in the world, induced him to dwell with more emphasis upon subtle distinctions of words, and upon certain dogmas in metaphysics. His followers employed themselves in composing numberless commentaries and dissertations on his works, and in contending about his abstract notions of "sensible and intellectual species"—of "intention," "remission," and "proportion"—of "infinity," "quiddity," and "individuality." In all these disputes, Christians, Jews, and Mahometans, were united in professing assent to the "great lawgiver of human opinions." In so great demand were his writings that the Arabic language was studied by many individuals, in order to read a translation of them in that tongue.

An amusing specimen of the logic current in those times, is exhibited by one of the fundamental dogmas of the peripatetic school, of which Aristotle was the founder. The peripatetics affirmed that the communication between matter and mind was effected by means of certain images or films, which they called *sensible species*. Thus, for instance, the *sensible species* of a tree, of the exact form of its original, passes off from the tree to the eye, thence to be conveyed by the nerve of sight to the brain. In the brain, the *sensible species* now forms its impression, like the stamp of a seal on wax, and being refined into an *intellectual species*, the idea of the tree is fully formed in the mind, as far as vision is concerned. The same principle applied in the case of the other senses, accounted for the whole phenomena of sensation and perception. That the mind of man should have been absorbed by such speculations, seems strange indeed: but passing strange it is that two celebrated schools of philosophy should have disputed for years, whether these *sensible species* were images only, or material emanations from the objects of sense.

So violent, and so universal, was the mania for such scholastic disputation, that, in the reign of Pope Innocent III., the thunders of the Vatican failed to prostrate the physics and metaphysics of Aristotle. And soon it was deemed expedient for the papal see, not only to tolerate the principles of the Grecian dogmatist, but even publicly to recommend some of his writings. So late as the close of the twelfth century, statutes were framed in several European universities, requiring of the professors a pledge upon their oath, not to follow any other system of philosophy in their public lectures.

With the general adoption of the doctrines of Aristotle commenced an era in philosophy—an era of intellectual thraldom, which was passively endured for nearly two thousand years. Meanwhile the torch of science grew gradually more and more dim, and was eventually almost extinguished in the strife of words. At length, in the fifteenth and sixteenth centuries, a few daring minds appeared, to loosen the fetters that had so long enchained the human intellect in voluntary bondage. The Pythagorean system of astronomy was revived and ably supported by Copernicus, who rose like the star of the dawning day to betoken the appearance of a brighter luminary. This brighter sun was Francis Bacon. By him was the darkness of the middle ages dispelled, the lamp of science relumed, and the mists that clouded the morning of a glorious day dissipated. He it was who first effectually declared independence of mind from the paralyzing influence of the Stagyrite. By his light was an important organ of the human body developed, and mankind taught that they had eyes of their own, by the exercise of which the subtle abstractions of metaphysics, and the gossamer fabrics of imagination were to be supplanted.

Of the writings of Lord Bacon, the most valuable is the "*Novum Organon Scientiarum*," or a *new machine of the sciences*. The characteristic feature of this new method of studying the sciences, is the development and application of the grand principle of induction. The groundwork of the inductive philosophy, consisted in a *history of nature*, or an ample collection of facts, carefully ascertained by observation and experiment. Upon such a foundation is a system or theory to be constructed, and "conclusions are in all cases to be drawn only from what is actually witnessed, after the arrangement and comparison of a sufficient number of facts, and a due regard to objections." This certain theory of investigating all natural and moral truth, has been styled the Baconian method; and its great author has been deservedly honored with the appellation of the "Father of Experimental Philosophy."

To construct a system in any branch of science without this sure foundation, is, according to Bacon, to *anticipate nature*. "The method of anticipating nature," says he, "rash, hasty, and unphilosophical as it is, has, nevertheless, a much greater power to entrap the assent of the mind; which is too apt to be delighted with its own conjectures, and to allow the imagination to be struck and filled with its own plausible subtleties; whereas, *interpretations of nature*, or real truths arrived at by induction, being separately and more slowly collected, cannot so suddenly arrest the mind." It was by *anticipating nature*, that the celebrated Kepler was led to assert, in the early part of his career, that the number of planets in the solar system must be six; because of some imaginary virtue of that number. It was the same *anticipation of nature*, and from the same fancied attribute of the number six, that induced the German Huygens, who discovered one of Saturn's moons, to affirm that this,

added to the four of Jupiter, and the one belonging to our globe, completed their number, as six did the number of the planets; and that it was in vain to search for any more. It was this blind *anticipation of nature*, through the imaginary power of the philosopher's stone, that concentrated the labors of the Arabian Alchemists upon that one sordid object, and stamped as useless every result of their experiments which fell short of realizing their golden dreams. The great *Linnæus* was trammelled by a similar *anticipation of nature*, when he made the varieties of the calyx, and other parts of a plant to correspond in number with the numbers in the table of time. Of latter years, the creative Darwin *anticipated nature* in his brilliant theories, now mostly obsolete—distorting facts to support conjectures, or even in some instances, generating them in his fanciful brain, to give greater currency to his speculative views.

A more detailed account of the principles advanced by the founder of inductive philosophy, would be useful and interesting. To trace their revolutionizing operation, would be to give a history of science for the last two hundred years. The advancement of the human intellect during this brief period, when compared with the past ages, is almost incredible. Secured on a permanent basis, there seems no reason to apprehend that the mind of man will ever again relapse into its former abject and deluded condition. The wand of Aristotle is broken, and his name has lost its magical power. Ignorance, credulity, prejudice, and superstition, cannot again tyrannize over human reason, and paralyze the exertions of our noblest faculties. Observation, reflection, reason, are rapidly gaining the ascendency over an unbridled and wanton fancy. True, there are many great men at the present day who devote their talents to the cultivation of poetry and romance; and such there will be so long as the trivial and unprofitable works of the imagination are read and admired. The most perfect state of society that we can reasonably hope for will be alloyed with drones and idlers, dreamers, and mischief-makers. Children and fools will exist as long as the human race exists. But perhaps the intellectual character of a community and of a nation depends principally on the character and exertions of a few individuals. A tithe of the population can impart a scientific and literary cast to the whole body; though the remaining nine-tenths be stupid and brutish.

Without applying these remarks particularly to our own country, we may confidently venture the assertion, that America will, in another century, be second to no nation on earth, in intellectual character.

FRANKLIN.

For the Advocate of Science.

NATURAL HISTORY OF THE BEE.—[Concluded.]

It frequently happens that the bees find it necessary to strengthen the attachment by which their combs are suspended. These attachments are made of wax, and when the comb becomes heavy would give way if not attended to. The sagacious animals tear away the first row of cells, and substitute for the original wax, a composition of propolis and wax, which forms a very tenacious and permanent cement.

It is evident that if too large a portion of the attachment of the comb be thus removed for the purpose of renewal, the comb will be liable to fall. The little artizans are aware of this, and therefore confine their labors to a single row of cells at a time; and when this row is completed they commence the opposite one.

Cleanliness is one of the leading attributes of bees. They are very careful to remove every thing offensive. Should a snail be so curious as to walk into their house for the purpose of prying into their concerns, he is immediately put to death. And his carcase being too large for them to remove, they set to work and bury it with their tenacious propolis, so that they need not suffer from the unpleasant odor. Reaumer observed a snail which had just entered a hive, to fix itself leisurely in a spot where it could put forth its head in case of rain to enjoy the shower. The bees soon discovered him, but as he was safely at rest in his shelly house, they could do him no injury with their stings. How were they to get rid of the intruder—or to punish him for his impudence? With very little deliberation, they set to work, and glued the edge of his shell, all round, to the surface on which he had fixed himself. So that the poor fellow, who doubtless had intended them no harm, died of starvation and want of air, in his own house.

I have already made some remarks on the antipathy manifested by the queen bees against their royal progeny. In one hive there are often as many as twenty royal cells, destined to produce queen bees. While the metamorphosis of the insects in these cells is going on, they are constantly guarded by the workers. As soon as the larvæ are transformed into the nymph state, the old queen becomes infuriated, and attacks the cells, tearing them open with her mouth, and murdering the helpless animals within. The workers allow her to go on till she is exhausted, which happens when she has eaten through two or three cells. Being unable to use any more exertion in this way, she runs about the hive in a fit of passion, collects as many of the workers as she finds willing to accompany her, and sets off with them to found another hive.

After the departure of this swarm, the bees continue to guard the royal cells, till at length one of them sends forth a queen, who is instantly seized with the same barbarous jealousy against her sex, and attempts to tear open the remaining royal cells. But the workers have less respect for her than they exhibited towards their mother queen, for they bite and drive her off; when she in her turn gathers together another set of the workers, and departs to establish another colony. In this way several swarms are sent forth from the same hive.

Should three or four of the infant queens be about to issue from the cells at once, the guards detain them all except one, by keeping their apartments closed with wax. This is to prevent the consequence which would follow the presence of several queens at the same time; which would of course be fatal to all but the one who would murder the rest. The prisoners thrust their antennæ through a small aperture in the lid of the cell, and pipe for food; when the guards supply them with as much food as they want.

The ventilation of the hive is a curious operation, performed by the workers. These range themselves in files about the bottom of the hive, and unite their wings in one piece by means of little hooks, with which they are supplied; they then move their wings in concert, producing a current of air which may be detected on the outside of the hive. The heat of a bee hive is excessive. In spring it is from 90 to 97 degrees; but in time of swarming it rises to 104 degrees.

It is no uncommon thing for bees to engage in duels and kill each other. Indeed, in all their battles they engage two and two. Occasionally, when domestic affairs are not well managed, the swarm becomes an organized band of robbers who pilfer the neighboring hives. A sanguinary battle is apt to ensue in this case, which terminates as soon as one of the queens is killed; when all the combatants immediately unite under the dominion of the surviving queen. Sometimes several honey bees, who are not disposed to work much, waylay a humble bee as he is returning to his home laded with honey. They do not, however, take the life of the humble bee, but only maul and pommel him till he gives up his honey—he is then set at liberty.

There is a species of moth, of a large size, which is very injurious to apiaries: Huber found his bees suffering from the nocturnal visits of this depredator, and fixed a grating before one of his hives, which the bees could pass, but not the moth. But he found, on examining other hives, that the bees had already discovered and put in execution a similar plan of defence. The fortifications which they had erected were composed of propolis and wax, and were made very differently in different hives. In one there was a row of low arches—in another, several walls pierced with holes; the holes in the different walls of the same hive, not corresponding to each other.

The sting of the hive bee is a formidable weapon, composed of two barbed darts, enclosed in a sheath. At the base of the sheath is a bag of poison,

which they instil into the wound made by the sheath; and it is this poison that makes the wound of a bee sting so painful.

In Mungo Park's last mission to Africa, some of his party were so furiously attacked by a colony of bees which they had disturbed, that they were forced to fly for safety. A number of valuable lives were however lost in the affray—the list of the killed and missing amounting to one horse and six asses!

Lesser gives an account of an attack which was made in Germany, a good many years ago, on the house of a minister, by a mob of robbers. The proprietor of the mansion not being able to deter them from their undertaking by words, ordered his domestics to fetch his bee hives, and throw them in the midst of the infuriated multitude. The hostile array was dispersed almost as speedily as by the explosion of a bomb.

There are many other curious circumstances in the history of the hive bee, which want of time compels me to pass over. The killing of the drones, or male bees, by the workers, which belong to neither sex, is a cruel but salutary process. A community of bees appears to be subject to many of the incidental occurrences which take place in human society; and to be regulated by laws equally determinate, but far more effectual in many cases. Social intercourse has been observed between two hives, when the bees visited each other for eight or ten days. A sanguinary battle, however, resulted, occasioned perhaps by some individual affront. Sometimes a number of the inmates of a hive become obnoxious to the body, by reason of bad habits, or of unsound opinions. The majority, in this case, often fall on the criminals, or heretics, as may be, and put them to death.

In many of its habits, the humble bee is equally curious with the hive bee, though by far less ingenious and enterprising. A colony of humble bees consists only of one or two hundred inhabitants; and instead of building in sheltered places, they make their dwellings on the surface of the ground, or just beneath it. They have no queen bee to govern them with imperial authority, nor any privileged classes, nor drones, to live by the industry of the laborers. But they are all workers. There are two classes of females, one much larger than the other; these classes regard each other with jealousy, though they are not so inimical as the queen bee to her rivals. Their storehouse is covered with moss or dried grass. Huber placed a swarm of humble bees in a situation where they could procure no moss; the bees attacked a piece of linen within their reach, tore it to pieces thread by thread, and carded it with their feet, till they had formed of it a very good substitute for moss, with which they lined their habitation. Their manner of conveying moss to their nests is very curious. A row of bees is formed, and the foremost individual seizes a tuft of moss and pushes it within reach of the next one, and this one in turn transmits the package to the succeeding bee. This is an application of the principle of the treadmill.

The humble bee is more expert in discovering the nectary of flowers than the hive bee. For it is known to slit open the corollas of tubular flowers to extract the honey. I have seen the flowers of the dwarf or Persian lilac thus rifled of their honey. The corolla of this plant has a long tube which the humble bee cannot fathom with his proboscis; but the ingenuity of the insect supplies a means of access to the treasure, by teaching it to split open the base of the tube.

Huber relates a case where a colony of hive bees, in a time of scarcity, pillaged a settlement of humble bees, and took possession of their hive. A few of the vanquished party lingered about their old home, and collected honey from the fields, which they brought to the hive. The honey bees met them, licked and fondled them, and finally coaxed them to give up in peace the food they had gathered. B. E. E.

Sawdust bread!—Everybody has heard of Dr. Franklin's sawdust pudding. But we are indebted to a German for the discovery of a method of making it into a *nutritive and wholesome bread*, not quite so palatable, however, as that made of flour. Modern discoveries in chemistry, and improvements in domestic economy, have developed numerous sources of food, before unknown, or unavailable. The proprietor of an agricultural establishment in France, lately discovered a method of converting into flour the straw of wheat and other grains. This flour is described as coarse, but agreeable and nutritious, and making bread of a quality superior to the common bread used by the lower orders on the continent. Still more recently a scientific Frenchman devised a mode of converting bran into flour, by which sufficient bread can be made of the refuse parts of the grain annually ground in France, to support thousands of people. In the same country, bones are extensively used as an article of food, being softened and made into a rich and highly nourishing soup, by the heat of steam. The quantity of bones thrown away in the city of Philadelphia, would, in all probability, be more than enough to sustain all the paupers in this city, and all the inmates of its prisons, and benevolent institutions.

THE ADVOCATE OF SCIENCE.

Sixth Month 6th, 1833.

The questions which were last sent us by "Barbara," will be answered in our next number. We shall also have a word for *Juvenis* at that time. The essay on American Literature and Science is unintentionally crowded out. We will try to satisfy the curiosity of our fly-killing correspondent, in our next number. Meanwhile, we advise her not to *exterminate* the species, lest a more odious race of animals might succeed them.

If any of our readers have entertained an apprehension that the pursuit of science and the contemplation of nature are unfavorable to religious sentiment, let them ponder the following remarks, coming from persons who felt what they wrote. The former extract is from Turner's Sacred History of the World. The author, after speaking of the various processes of animal and vegetable life, continues: "I devoted two years specially to these considerations, when the full enjoyment of the strength and spirits of eight and twenty made every employment easy and pleasant, that I might have such ocular demonstrations of the course and processes of nature as I could then attain. The result of all these inquiries was, that my mind became fully satisfied that every substance in nature was a combination of elementary particles; that no particles could of themselves form the diversified and skilful and constant organizations which were everywhere around me, and of which my own body was to myself a conscious specimen. Succeeding years of reflection, and more knowledge, have confirmed these earlier deductions, and provided a source of unceasing happiness to my enfeebled age from the considerations to which they lead, and from the hopes and prospects which they are ever opening before it. Organization, then, became to me the decisive teacher of a creative intelligence. The elementary particles of things must have been in a separate state before they were combined into organizations; and nothing but a designing intelligence could have formed them into these. Here my mind found its intellectual rest, of which it has never since been dispossessed."

The other extract is the concluding paragraph of the "Journal of a Naturalist:" "They who have had the patience to read these my notes, will probably be surprised that I could take the trouble to register such accounts of such things; and I might think so too, did I not know how much occupation and healthful recreation the seeking out of these trifles has afforded me, rendering, besides, all my rural rambles full of enjoyment and interest. Companions and intimates were found in every hedge, on every bank, whose connexions I knew something of, and whose individual habits had become familiar by association; and thus this narrative of my cotemporaries was formed. Few of us, perhaps, in reviewing our by-gone days, could the hours return again, but would wish many of them differently disposed of, and more profitably employed. But I gratefully say, that portion of my own passed in the contemplation of the works of nature is the part which I most approve—which has been most conducive to my happiness; and perhaps, from the sensations excited by the wisdom and benevolence

perceived, not wholly unprofitable to a final state, and which might be passed again, could I but obtain a clearer comprehension of the ways of Infinite Wisdom. If, in my profound ignorance, I received such gratification and pleasure, what would have been my enjoyment and satisfaction, 'if the secrets of the Most High had been with me, and when by His light I had walked through darkness?' "

After such testimony, and with a little experience of the same things, it seems to us brutal—beneath human nature, for any one to affect to despise those pursuits. When we meet an individual of this description, we always suspect, that, like the hardened criminal who is dead to all moral feeling, he has so far and so long perverted his natural qualities and disposition, as to have lost some of the most noble attributes of humanity. Such a person is almost irreclaimable. To imbibe correct sentiments, he must first part with his depraved ones; and an author observes, "the mind cannot unlearn." No one can be too deeply impressed with the importance of a proper early education. One hour in very early life is worth a month in after age. Let teachers think again and again on this subject; and let them study with their whole soul, to infuse such principles into the infant mind, and to foster such tastes and inclinations as will insure elevation of character, moral and intellectual, and rational and exalted happiness in after life to their possessor.

On the evening of the 17th ult., a very remarkable phenomenon was seen. A brilliant aurora was visible at 8 o'clock, extending from N. W. to N. E. having a cumulo-cirrhus cloud at its base. It was attended with coruscations, which shot up occasionally about 45°, without the appearance of any thing unusual, and continued with little variation during the remainder of the evening. About 15 minutes past 10, a coruscation shot up from E.S.E. (!) about 25° above the horizon, and proceeded in a straight line till it arrived at a corresponding height in the west, both ends being bounded by a dense cumulo-cirrhus cloud. It was of a brilliant silver white, about the color and brightness of the moon when seen through a very thin cloud, and it gradually widened till it had attained a diameter of near three degrees, (apparently six or eight feet.) In this condition it remained for fifteen minutes, with no variation except in width; at 10½ o'clock it began to disappear, and in five minutes after, its place was occupied by the cloud which had been located at its base. The aurora in the north continued visible till obscured by the clouds, which were passing from S. W. On the succeeding morning we had a foggy atmosphere till 10 o'clock; after that beautiful specimens of the cirrhus form were to be seen during the remainder of the day. In three days, we had an easterly storm, accompanied with considerable lightning and a high wind.

The theory of auroras is one respecting which some diversity of opinion exists. From the period at which Franklin discovered the identity of lightning and the electric fluid, philosophers have been led to seek, in the principles of electricity, an explanation of many meteorological phenomena; so that at the present time no one doubts that auroras are occasioned by the immediate agency of electricity. It was exhibited by Mr. Canton; who made use of the Torricellian vacuum, by taking an exhausted glass tube about three feet long, and hermetically sealed at both ends, and applying one end to the conductor of an electric machine. Thus, the whole tube was illuminated from end to end, and remained luminous some time. It is also known that the magnetic needle is considerably affected during the continuance of auroras in the northern regions.

Perhaps it is unnecessary to enter into a full detail of reasoning to prove that auroras are caused by electricity; so universally is the opinion adopted by all philosophers. The next question which occurs, then, is *how* are they caused by this fluid? We will endeavor to answer it.

The cold, dry regions round the poles, are very favorable to its accumulation: more so than any other parts of the globe. And as it is there continually collecting, it must, of necessity, find some medium to throw off its superabundant portions: these must be transmitted to such parts of the earth, or air, as are negatively electrified, or have *less* than their medium quantity of electricity; so that an equilibrium may be partly restored:—on the same principle as a body of water must flow from a higher into a lower basin, till its whole surface is perfectly level. Now, as a dry atmosphere, by virtue of its nonconducting power, is capable of retaining electricity, a damp one, being a good conducting medium, will readily part with it. By this means, the atmosphere over a whole extent of country, may silently discharge a greater part of its electric fluid in the earth. Thus the air becomes negatively, and the earth positively electrified. Humboldt observed that in the tropical and temperate climates, the lower stratum of the air was generally positively electrified, but that it alternately passed in the course of eight or ten minutes to the negative state. How is this to be accounted for, if not by the earth abstracting the fluid from the lower atmosphere, but not so fast as the lower received it from the upper stratum? Its supplies might not be regular; but the earth would conduct equal portions in equal times; thus, while the lower atmospheric stratum would be receiving, at one moment, but a small portion from the upper ones, the earth, with its regular conducting power, would deprive it of its positive quantity, and leave it in a negative state, till supplied again from above: the upper one would thus soon be in a negative state. If, therefore, there be a superabundance of electricity in the northern countries, this must be discharged in a more southern atmosphere, which is negatively electrified. And in passing along through an atmosphere which is very high and very subtile, it would be rendered visible like the electricity in the exhausted tube. Hence we see how auroras may be caused by the passage of the electric fluid to different sections of the atmosphere.

Some have supposed auroras to be entirely without the limit of the earth's atmosphere; consequently, the theory which we have given could not be a correct one; for, in this case, the earth's atmosphere about the tropics could have no influence whatever on its motions. Euler supposes their height to be several thousand miles; some other philosophers also assign to them a very elevated region. Mr. Bergman, from a mean of thirty computations, makes their average height 469 English miles. And Dalton computes the rainbow-like arcs, such as we have described, to be 150 miles above the earth.

That they are not beyond the earth's atmosphere, may be fully seen from this circumstance. At Hudson's Bay, during the continuance of an aurora, which there equals the full moon in brightness, a hissing noise is heard, as though fire works were playing off. The hunter's dogs become so terrified that they will not move, but lie on the ground with great obstinacy till the noise ceases. This noise would not be heard if the aurora was without the earth's atmosphere; for every body knows air is necessary to the conveyance of sound, and we might as well have no ears at all, and rather better too, than to be where there is no air, even admitting we *could* exist in such a vacuum.

We have but little more to say at the present time, and that is in relation to the original subject of our remarks. No one questions but that it was an aurora; and if it was an aurora, it must have been caused by electricity; if it was caused by electricity, it must have been by the fluid passing from one part of the heavens to another; and in order to do this, the part from which it originated must have been positively charged, and that to which it proceeded, negatively so. For near two weeks after its appearance, the weather was almost continually cloudy, attended with frequent and heavy showers of rain. The week preceding it was also cloudy and rainy.

Answers to Barbara.

2. "What is the cause of the different colors which we perceive the sun and moon to put on at different times, especially when near the horizon?"

The sun and moon assume three different colors, owing to the state of the air through which their light penetrates. These colors are *red*, *silvery white*, and *pale white*. Before the cause of these various hues is explained, we must make a few remarks on the nature of light.

Colorless light, or such as emanates from a common candle, is composed of a variety of colors, which, when blended together, cause the body to appear white. Certain substances possess the property of decomposing this light, or separating it into rays of

seven different colors, of which the white light is composed. The drops of water in the air have this effect on the light of the sun, in forming a rainbow. If we look through a glass prism, we observe the same variety of colors.

In explaining the laws of refraction in a previous number, we remarked that light, in passing from one medium into another of different density, is refracted, or bent out of a straight course. Now, rays of some colors are found to be more refrangible than those of other colors. If light be passed through a glass prism, it becomes decomposed, because its red rays are more diverted from the straight direction than the other colors. Orange comes next in order, then yellow, green, blue, indigo, and violet, in succession. Hence, if the light thus refracted and decomposed by the prism, be suffered to fall on a white wall, or screen, all these colors will be represented, in the order named. The rainbow is produced on the same principle.

When the light of the sun or moon reaches the eye, unchanged by the medium through which it has passed, the luminous body appears white, and shines with a silvery lustre. But, if a vaporous or hazy state of the atmosphere exist, the apparent color of the sun or moon undergoes a change. If the atmosphere be hazy and dry, the luminary is red, because the red rays have a more penetrating power than the others. Vapor and mist obstruct alike the passage of all the colors, and hence the luminary is only dimmed, without its color being varied.

When the luminous body is near the horizon, its rays coming sidelong through our atmosphere, have to penetrate a much greater distance of air before reaching the eye; and hence its color is more frequently and more readily affected in this situation.

3. Why do the clouds assume such various colors after sunset?

This phenomenon also depends on the laws of refraction. When the sun has set, the body of air above our heads, and the clouds which float in it are still illuminated by his rays. These rays are also refracted in their passage through the air. When the atmosphere is dry and dense, it appears to possess its highest degree of refracting power, and is then able to throw the red rays within the range of our vision. Here, the clouds appear red. If the atmosphere be watery, or loaded with aqueous vapor, it is not capable of refracting the sun's rays so much; but, as it still decomposes them, the violet rays, which are least refracted, strike the eye, while the red and other colors are so much refracted as not to fall within our sphere of vision. When the clouds appear yellow, the atmosphere is in a medium state with regard to its refracting power, refracting the red rays too much to render them visible, and the violet rays not enough.

The factitious word *vibgyor*, gives the initials of the seven colors, in the order of their refrangibility, commencing with the least refrangible, or violet. In every instance of the decomposition of light, the different colors are uniformly presented in this order.

4. Why does a red sky after sunset, indicate dry weather?

We have already explained this, in stating that this color of the sky and clouds, is produced by a dry and dense atmosphere. Such an atmosphere is, of course, favorable to the continuance of dry weather.

For the Advocate of Science.

Having the pleasure of being one of the readers of the "Advocate of Science," I feel at liberty to offer some remarks in relation to the interrogatory proposed by Barbara—"What is the cause of the hazy or smoky state of the sky in Indian summer?"

The reasons assigned for this phenomenon, in the last number of the Advocate, are such as cannot be sustained either by observation or reason. Though it cannot be doubted that vegetables, both in a growing and decaying state, emit "effluvia," it may be well to inquire what this "effluvia" is, and whether it be capable of undergoing a "chemical change analagous to combustion," according to the present knowledge of chemical laws.

By experiment it has been found that growing vegetables emit only oxygen, carbonic acid gas, and aqueous vapor; and decaying ones, light carburetted hydrogen, carbonic acid gas, and aqueous vapor. Of each of these products, neither one is *capable* of a "change analagous to combustion," under *any circumstances*, except the carburetted hydrogen. Even supposing *this* capable of the change, viz. a "carbonization effected in the upper regions of the atmosphere," it should first be proved that this compound *exists* there. That it has been proved not to exist there, or in the atmosphere at all, to any perceptible extent is sufficiently evident; for the nicest analysis of air, collected either in the lowest valley or at the summit of the highest mountain, has never detected a variation in its constituents, more than a trifling amount in the proportion of carbonic acid gas, diffused through the oxygen and nitrogen, which constitute the body of the atmosphere.

A more consistent and reasonable cause for this appearance, is the process of combustion on the earth's surface. The smoke from our cities, villages, and rural cottages, at any season of the year, (independent of the fires in the forests and prairies, which always exist during Indian summer) would be fully sufficient to cause the phenomenon, in case it could be retained at the surface of the earth. Generally, the atmosphere is the heavier, and consequently the smoke ascends. It may be observed that we never have this haze, except when the barometer stands very low, and the presence of a southerly wind; and that a rise in the barometer, and a northerly wind disperses it. These facts evidence that the pressure of the atmosphere has an effect upon the haze; the latter increasing as the pressure decreases, and is dissipated as the pressure increases.

Hence we may justly infer that the smoke produced by combustion, being prevented from ascending in the air by the greater levity of the latter, must remain in contact with the earth, and produce the phenomenon in a greater or less degree, at different seasons of the year, according as fires, independent of those required in social life, prevail to a greater or less extent. JUVENIS.

For the Advocate of Science.

SCIENTIFIC RAMBLE.—No. 3.

Father. Perhaps your cousin will join us in our walk of to-day. It would be a breach of politeness in us to leave her so unceremoniously. What say you, Ellen?

Ellen. With all my heart! I am curious to witness one of your peripatetic promenades. Louis has given me so droll a narrative of your last excursion, that I am very glad to accept your invitation, though I shall scream at the first spider that looks at me.

Louis. You will soon get accustomed to them, cousin. I dreaded them at first, but now I look at them just as I do at that old lady with her spinning wheel.

Father. The spider improves very much on acquaintance, I can assure you. Did you know a little of his history, you would be pleased with him.

Ellen. What a horrid subject for conversation! Pray, talk of something else; the very thought of the odious creatures makes me nervous.

John. I'll take side with you, cousin. It is a shame to mention such things before a delicate lady. But you must make some al-

lowance for my brother Louis. He was born under Scorpio, as the celebrated Maria Schurrman used to say in justification of her propensity to devour spiders.

Ellen. Awful! you are in jest, certainly.

John. Not at all. Such depraved appetites are not unfrequent. When I am through with the "Natural History of Insects," I will lend it to you. It tells of certain South Sea Islanders, who cook an enormous sort of spider for food; and of a very young French lady who could never resist the temptation of eating a spider whenever she met with one in her walks.

Ellen. Away with such books! I thought you had better taste, John! You shall have my thanks to get me "Waltham," which is now publishing in Waldie's Circulating Library. I am fond of such works as cultivate taste and imagination.

Father. And have you ever reflected on the evil tendency of those writings which feed and excite the fancy?

Ellen. I have experienced the pleasure they afford. But, let me ask you why Providence has endowed us with the faculty of imagination, if we are not to employ it?

Father. Use and abuse are far from being synonymous terms. When one faculty is cultivated at the expense of the others, it is abused. The imagination is very useful in its place; but man is endowed with other gifts—he has powers of reasoning or reflection. These can never gain an undue control over us. But the imagination can; as the old proverb says of fire, it is a good servant, but a bad master.

Ellen. I think I can mention a single name that will refute your theory—Walter Scott. His immortal name is my talisman, to put down all dull, common-place, matter-of-fact logic. Compared with him, your stone-picker, and weed-gatherer, and spider-historian, is a mere drudge—a Battius, or an Oldbuck.

Father. Walter Scott was no doubt a great man; but he owed much of his greatness to the favor of nature. Had he made the most of his natural endowments, he would have gained a nobler character, and a more imperishable renown.

Ellen. It is difficult to imagine such a character. Scott is but another name for perfection, already. He could not stand higher than he does.

Father. The career of Scott was not a career that added much to his character. He set out sadly deficient in real knowledge, except of the historical kind; and depending mainly on his gigantic intellect, and his brilliant imagination, he neglected or despised the labor of using his external senses, and gaining a knowledge of things. Fancy was to him a more facile and a more delightful means of procuring materials for thought, than observation. These materials he worked up into the pleasing romances which the world owes to him. The result was that he ended where he began. His very best productions were among the first he wrote; and his very worst ones were the last. I think it impossible for any man thus to drivel, whilst he is making a proper use of his faculties.

Ellen. I never heard such heretical opinions before! You are too severe. Only look for a moment at the good Scott has done the world by making a complete change in the school of fiction,—by abolishing the old love-sick novels, and substituting useful historical ones.

Father. Your remark is not to the point. I argued that the retrogression, or at best, the absence of improvement in the mind of Scott, implies that his faculties were not directed in the proper course.

Ellen. But you cannot expect perfection in any thing human. Let us be grateful to him for the good that he has done.

Father. I differ from you in that respect. It is true, he has changed the style of novels; but he has also extended the reading of them. I think the whole phalanx of fictitious books injurious. If a reformer in morals should cause wine to be substituted for ardent spirits, in the community, he would do a good thing, in the abstract. But if his reformation should so extend the use of wine as to make twice as many drunkards as before existed, it would be an evil thing.

Ellen. I feel confident that my great Apollo can be defended, were I but capable of contesting the subject with you. It occurs to me that you undervalue the imagination. We often derive more pleasure from it, than from the application of the observing and reflecting faculties. Thus, Campbell says of the rainbow, alluding to the veil of enchantment being withdrawn from it by science—

"What lovely visions yield their place
To cold material laws!

Father. The most pitiful sentiment ever uttered by Campbell! It is equivalent to repining because one is endowed with vision and reason.—But see, John has found something for us to examine. Let us make haste to reach him.

Ellen. Murder! do lead me some other path! I can't bear those horrid reptiles.

Louis. Hold in your fancy, cousin! There's nothing in your way. Come along!

Ellen. I can't, till you drive away that odious toad. I always had an awe of toads, and never could see the use of them.

Louis. They have a very important design, cousin. Nothing less than to make paths through the marshes by packing down the ground!

John. I hope, brother, you will not forget that your fondness for science is very recent. If you don't stop your ridicule, I will tell tales of you.

Louis. I know so well how our romantic cousin feels among the frogs and spiders. But what did you call us for, John?

John. I wanted you to see this singular animal that I caught among those stones. It has legs enough for twenty such things. Come nearer, Ellen, and examine it.

Ellen. It's a tarantula! Indeed I can go no further. Louis, I must beg of you to return with me. I cannot feel my life safe in this place.

* * * * * * * *

John. It is very strange that so intelligent and sensible a girl as my cousin Ellen should behave in that way! I had not supposed it possible!

Father. It is natural enough. She has a fine mind, and has read much. But her reading has been of a particular kind, to which she is now indebted for her morbid sensibility, and foolish panic. She is, like a greater number of her sex than you would at first suppose, the creature of fancy and romance. She does not live in the material world, but in one of her own creation. It is not surprising that a mind of this perverted and sickly constitution should be incapable of reflecting on a subject so humble as an insect, and should judge of an object by its first impression on the eye, giving full play to every whim, and every prejudice. Her head is filled with brilliant conceptions of scorpions and tarantulas, and she is horror-struck at the thought of such things. Had she spent a hundredth part of the time she has lavished on novels, in reading some light treatise on the history of insects, instead of imagining that innocent little animal to be a tarantula, she would have known that no tarantula was ever found in this country.

John. We used to call an insect resembling this in form, but much smaller, the *forty-legs*. Is there no other name for it?

Father. Its proper name is *centipedes*, meaning *hundred legs*. It is so named on account of the number of its legs.

John. If I had known that sooner, I might have regaled cousin Ellen with another shocking idea. In the same book I spoke of, it is stated that the native children of Brazil chase a large species of centipedes, a foot long, into their holes, and digging them out, craunch them alive, just as we eat a radish.

Father. That is told on the authority of Humboldt, who is a man of veracity. There is a species of the same animal used as a medicine, in some parts of the world. The animals are gathered and put into a bag, and then killed slowly by holding the bag in the steam of boiling water. This medicine was once in pretty general use.

John. It is consoling to reflect that one lives in a more refined age of the world.

Father. Not so fast, my son. You may recollect that insects are even now used for medicine, and very properly, in some cases. Thus the cochineal, which is a small bug very like our little lady-bug, is sometimes a useful remedy in whooping cough.

John. Ellen must know that I saw her a day or two since, adding cochineal to some article of cookery, to give it a fine color.

Father. It is often used for such purposes. Druggists employ it to give a color to many of their tinctures. There are some curious

facts in the history of that insect, which I will relate at another time, when Louis shall be present.

John. True; and we would like to have some history of the spider also. Louis has become quite interested with his novel studies, and would be very much disappointed to be absent on such an occasion. Q.

MISCELLANIES.

1. *Weight of Light.*—In his Elements of Chemistry, Dr. Thomson says—We are certain that no particle of light weighs the one-millionth millionth part of a grain.

2. *Velocity of Light.*—In passing from the sun to the earth, light occupies eight minutes, or, according to La Place, nine and a half. Consequently it travels nearly 200,000 miles, while the pendulum of a clock is making a single vibration. One of the most rapid motions of which the human body is capable, is that of winking the eyelids; yet, during the space of time that we should employ in shutting the eye, light moves thousands of miles.

3. *Cause of the current flowing into the Mediterranean.*—This is referred by some writers to the effect of evaporation, which they suppose to be so rapid in the Mediterranean as not only to exhaust the supply of water afforded by the numerous large rivers of Europe, &c. but to require an additional quantity from the Atlantic. It seems to us that the effect of evaporation on the wide Atlantic would be a sensible diminution of the waters of that ocean, if evaporation be the cause of the current in the straits of Gibraltar. We are inclined to believe that some other source of diminution exists.

4. *Savage contentment, and savage philosophy.*—When the natives of Otahelte were exhorted to adopt the comforts of Europeans, they answered: "We should like these things very well, but we cannot have them without working; *that*, we do not like, and therefore would rather do without them. The bananas and plantains ripen on the trees; the pigs fatten on the fruits that fall beneath them. These are all we want. Why, therefore, should we work?"

5. *Fertility of vegetables.*—A thriving plant, of the mallow family, common in England, yielded in one summer, 200,000 seeds. It has been computed that if all the successive seeds of a single fern, of one peculiar sort, were to germinate without obstacle, this species would in twenty years cover the whole globe. In the spring of the present year, [May 1833] we made an estimate of the number of cherries on a large tree of the common variety, which was loaded with fruit, by counting the number on a single twig, and then computing the number of twigs on the tree, &c.; the whole number of cherries was found to exceed a million! Nearly all of these will arrive at maturity. The branches of the tree covered an area of 3000 square feet. Allowing the same dimensions to each tree, the second generation from the parent stock, composed of the *grand children* of the original tree, would be more than sufficient to cover the whole earth, even if its entire surface were dry land.

6. *Iron, magnesia, and gold, in vegetables.*—The ashes of hard and woody plants are said to contain nearly one-twelfth part of their own weight of oxide of iron. The oxide of magnesia also exists in vegetable ashes. Gold is also found, in small quantities, in some vegetables. Copper also exists in a great number of vegetables. It has been extracted from the Peruvian bark, from Martinico coffee, and from wheat.—*Fam. Library.*

7. *Rapid dissemination of plants.*—Vegetables sometimes spread with amazing rapidity when transplanted into a congenial soil; and many weeds appear to find every soil on the earth congenial to them. The most troublesome and inexterminable weeds of our soil are often foreigners. Such are the dandelion, buttercup, thistle, burdock, mullein, &c. It may gratify some persons to know that we have been able to retaliate, by peopling other countries with certain weeds, in return for the host of offscourings which have emigrated here. The common fleabane, (ERIGERON *canadense)* for instance, was received from America, about one hundred years ago, into the Paris gardens. It is now spread, as an offensive weed, over France, England, Holland, Germany, Italy, andeven to Sicily.

8. "*Every one to his liking,*" &c.—Although Chesterfield, or somebody else, has condemned the use of this proverb, yet it occurs to one's mind as often as any other. Darwin reminds us of it when he assures us that a certain species of caterpillar is delicious; and Reaumur, when he recommends another species as a delicate dish. Naturalists are very apt to acquire a taste for some such dainty morsel. Kirby and Spence think the ant good eating, and make a distinction between the flavor of its chest and that of its body!

9. *Influence of prejudice on the growth of the potato!*—We hope our readers will not be startled at this strange announcement. It only means that so great was the antipathy of the French to that famous vegetable as for some time to prevent its extensive cultivation in that country. But, on a certain occasion, the queen, in order, if possible, to do away this prejudice, appeared in public with a cluster of potato blossoms in her hair. The fancy took, and in a few years every Frenchman liked potatoes. Bishop Heber informs us that this vegetable is so much esteemed in the East as to be regarded as the greatest benefit the country ever received from its European masters.

10. *Defensive stratagems of birds.*—The poor little blue tomtit of England, which has neither beak, claws, nor any other weapon to defend itself from the weakest assailant, will nevertheless make trial, by menace, to scare the intruder from its nest. It builds almost universally in a hole of the wall, or a tree; and its size enables it to creep through so small a crevice, that it is pretty well secured from all annoyances except those of bird-nesting boys. These little plunderers the setting bird endeavors to scare away by hissing and puffing in a very extraordinary manner, from the bottom of the hole, as soon as a finger is introduced, and so perfectly unlike the usual voice of a bird, that many a young intruder is deterred from prosecuting any farther search, lest he should rouse the vengeance of some lurking adder or snake.—*Jour. of a Naturalist.*

Gigantic productions of Sumatra.—In Sumatra, there is a parasitic plant (*rafflesia*) which bears a flower a yard in diameter. The same island produces a tuberculous root, capable of being used as nourishment, which weighs 400 pounds; and melons and gourds half as big. An enormous shellfish is found on the coast, (CHAMA *gigas*) one of which would afford a good supper to 20 or 30 hungry men.

Light, independent of the sun.—There is a kind of fungus (rhizomorpha) which grows only in dark mines, when the light of the sun never penetrates. It gives out a phosphorescent light, and imparts to the coal mines near Dresden, the air of an enchanted castle. The roofs, walls, and pillars, are entirely covered with them, and, according to some travellers, their beautiful light almost dazzles the eye.

The Kangaroo—MICROPUS *major.*—It might be supposed that the defensive energies of this animal were located in the arms, since it often assumes the upright position of man, and attains the length of six feet. But they are placed about as far from them as well could be—in the tail. With a mere wag of this, it can kill any dog that sees proper to come within its reach.

AGENTS.

FRANKFORD. Pa.—*John Griscom.*
MOUNT HOLLY, N. J.—*Samuel Bullock.*
MORRISVILLE P. O. Pa.—*Hector C. Ivins.*
POTTSVILLE, Pa.—*Elihu Pedrick.*
DARBY, Pa.—*John Sellers Jr.*
BALTIMORE, Md.—*Joseph Earnest, N.W. corner of Eutaw Street and Carpenter Alley.*
ALEXANDRIA, D. C.—*Henry Stabler.*
WASHINGTON, D. C.—*William C. Ellison.*

☞ Responsible agents are entitled to every sixth copy.

ADVERTISEMENT.

☞ Books, Pamphlets, Handbills, Cards, Apothecaries' Labels, and every other description of PRINTING, neatly and promptly executed, on the most reasonable terms, at the office of "THE ADVOCATE OF SCIENCE," S. W. corner of Sixth and Cherry streets, Philadelphia.